

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Unlicensed Operation in the Band 3650 – 3700 MHz)	ET Docket No. 04-151
)	
Additional Spectrum for Unlicensed Devices)	
Below 900 MHz and in the 3 GHz Band)	ET Docket No. 02-380
)	
Amendment of the Commission’s Rules With)	
Regard to the 3650-3700 MHz Government)	ET Docket No. 98-237
Transfer Band)	
)	

Via the ECFS

COMMENTS OF IEEE 802

IEEE 802¹ hereby submits its Comments in the above-captioned Proceeding (“the NPRM”). ²

The members of IEEE 802 that participate in the IEEE 802 standards process are interested parties in this proceeding. IEEE 802, as a leading consensus-based industry standards body, produces standards for wireless networking devices, including wireless local area networks (“WLANs”), wireless personal area networks (“WPANs”), and wireless metropolitan area networks (“Wireless MANs”).

IEEE 802 is an interested party in this Proceeding and we appreciate the opportunity to provide these timely-filed comments to the Commission.

¹ The IEEE 802 Local and Metropolitan Area Networks Standards Committee (“IEEE 802” or the “LMSC”)

² This document solely represents the views of IEEE 802 and does not necessarily represent a position of either the IEEE or the IEEE Standards Association.

INTRODUCTION

1. On April 15, 2004, the Commission adopted the instant NPRM regarding the establishment of rules to “... *maximize the efficient use of the 3650-3700 MHz band (“3650 MHz band”) and foster the introduction of new and advanced services.*”³ The Commission continued:

*“In broad terms, the central proposal of this Notice would allow unlicensed devices to operate in either all, or portions of, this radiofrequency (RF) band under flexible technical limitations with smart/cognitive features that should prevent interference to licensed satellite services. Specifically, we propose to allow these devices to operate with higher power than currently authorized under Part 15 of the Rules subject to cognitive technology safeguards.”*⁴

2. We applaud the Commission’s efforts to make additional spectrum available for use by unlicensed devices at higher power levels, while avoiding harmful interference to licensed users.

3. We support the Commission’s view that “... *permitting unlicensed operation in the 3650 MHz band would foster the introduction of new and advanced services to the American public, especially in rural areas, and will result in a more efficient use of spectrum.*”⁵

4. In these comments, we make recommendations which we believe will speed the accomplishment of these objectives and assure the efficient use of the subject band.

³ See the NPRM, at 1

⁴ *Id.*, at 1

⁵ *Id.*, at 2

**THE COMMISSION SHOULD NOT PERMIT ADDITIONAL EXPANSION OF THE
FSS ALLOCATION IN THIS BAND**

5. The Commission asks: “*We seek comment on whether we should revise the 3650 MHz band’s existing allocations to permit new FSS operations in the band on a co-primary basis with unlicensed devices*”⁶

6. We believe that the Commission’s goal of fostering the use of this band for unlicensed services is an important one and that to allow additional new FSS operations in this band would create unnecessary and avoidable limitations on its utility for that purpose.

7. Additionally, the Commission asks: “*We seek comment on our proposal to retain footnote US245. Alternatively, we seek comment on whether we should recast footnote US 245 as a new footnote particularly for the 3650 MHz band (e.g., as footnote NGxxx), without the requirement for case-by-case electromagnetic compatibility analysis*”⁷. We believe that retaining footnote US 245 is appropriate in light of our recommendation above and that it should be maintained “as is.”

FIXED SERVICE AND MOBILE SERVICE ALLOCATIONS

8. With regard to the existing, but unused, Fixed and Mobile service allocations in the subject band, the Commission states: “... *if we adopt our proposal for unlicensed use in any portion of the 3650 MHz band, we propose to delete the FS and MS allocations for the portion designated for unlicensed use. We believe that the provision of ubiquitous licensed terrestrial services, in addition to FSS operations, would hinder the successful deployment of unlicensed devices in many areas.*”⁸ and “... *we seek comment on whether the 3650 MHz band’s current Fixed and Mobile (base station only) allocations should be maintained, modified or deleted.*”⁹

⁶ See the NPRM, at 25.

⁷ *Id.* at 26.

⁸ *Id.* at 28.

⁹ *Id.* at 29.

9. We agree with the Commission’s conclusion that a proliferation of licensed services in the currently unused Fixed and Mobile service allocations would hinder the successful deployment of unlicensed devices and services in the band and we support the Commission’s proposal to delete those existing, but unused, allocations.

10. We also believe that it would best serve the public interest for the Commission to make the entire 50 MHz in question available for unlicensed devices, under the conditions outlined below in the remainder of our comments. To fragment the band between licensed and unlicensed uses would make the spectrum far less useful and desirable for either.

PROPOSALS FOR PART 15 UNLICENSED OPERATIONS

11. With regard to the types of unlicensed operations that might be permitted in the subject band, the Commission asks: “*We seek comment on whether both fixed and non-fixed unlicensed devices should be permitted to operate in either all, or portions of, this band. Commenters should discuss all the benefits and costs associated with using all, or portions of, the 3650 MHz band for such unlicensed use*”¹⁰

12. We recommend that unlicensed operations in the subject band be limited to fixed, point to point operations only.

13. We believe that the nature and size of the band, consideration of the incumbent licensed operations in, and adjacent to, the band – *that must be protected* – and other factors discussed below render proposals for non-fixed operations much less practical – *both economically and operationally* – than would be the case for fixed point to point only operations.

¹⁰ See the NPRM at 39.

14. We further suggest that the limited size of this band and its propagation characteristics make it most ideally suited to use for point to point links, either building to building, or as “backhaul” links to connect the base stations of broadband wireless networks operating in other bands to locations where a connection to the Internet is available. We will expand upon this view below.

COMMENTS ON THE COMMISSION’S PROPOSALS FOR FIXED UNLICENSED OPERATION

15. With regard to permissible radiated power levels, antenna gains, etc., the Commission asks: *“We seek comment on our proposal to set a maximum EIRP of 25 Watts (14 dBW) for unlicensed RF devices in the 3650-3700 MHz band. Commenters who believe that it would be beneficial to specify other limits, such as transmitter output power and antenna gain, should provide details regarding the benefits or costs of such an approach as compared to our proposal.”*¹¹

16. The Commission further states: *“... we do not believe that fixed unlicensed devices should be prohibited from using any particular type of antenna.”*

17. First, we believe that the Commission’s assumption that *“... omnidirectional antennas would typically be employed ... in order to achieve the most uniform coverage of a particular geographic area”* would not result in the most efficient use of the subject band, where only 50 MHz of spectrum will be available.

¹¹ See the NPRM at 43.

18. The use of omnidirectional antennas would be inefficient and undesirable because, with only 50 MHz of available bandwidth (less necessary guard bands at the edges of that 50 MHz that will be required to meet out of band emissions requirements), the use of an omnidirectional antenna at 25W EIRP would effectively either:

- limit the use of the band to one “full-bandwidth” system per area;
- require the band to be segmented into narrower channels that would limit the attainable data rates;
- or require time-sharing of the available bandwidth amongst multiple systems, resulting in an undesirable net loss of capacity per user for each of the multiple systems.

19. However, if the Commission would follow our recommendation that unlicensed operations in the band be limited to fixed, point to point operations only, it would be technically feasible to support many full-bandwidth, high data rate links in closer geographical proximity with only a modest amount of coordination amongst their operators.

20. Furthermore, we believe that the Commission should specify a maximum transmitter power and power spectral density – as well as a minimum allowable directional antenna gain based on essentially the same rationale as in its rules for unlicensed fixed, point to point systems in the 24 GHz band.¹²

21. Using the same general rationale as the Commission used as the basis for modifying its rules for the 24 GHz band, and considering the characteristics of, and the limited number of licensed systems in this band requiring protection, we believe that it would be possible, with proper link engineering, to allow on-axis EIRPs considerably higher than the proposed 25W (14 dBW), while still avoiding the potential for harmful interference, both to licensed services and between a multiplicity of unlicensed point to point links.

¹² See, generally, the Report and Order in ET Docket No. 98-156 (FCC 01-357, released December 14, 2001)

22. This would allow point to point links to bridge longer paths. However, systems should be required to use the minimum EIRP necessary to bridge the intended path with sufficient fade margin to the required C/N ratio to permit reliable operation (we would propose 99.999% availability as the measure of “reliable operation,” given the intent to use these links for backhaul and other applications that would provide service to a multitude of users).

23. Additionally, we would propose that the engineering of such links should take into consideration the unique issues associated with FSS earth stations in the adjacent 3700-4200 MHz band. These are receive only stations in this band, many of which are intended to receive television programming “feeds.” Such link engineering should ensure the necessary geographical/spatial separation to assure both that out of band emissions from the unlicensed links would not cause interference in the intended passband of the FSS earth stations and that on-axis fundamental emissions from unlicensed devices in the adjacent unlicensed band do not cause harmful overload of the very sensitive receiver front-ends of the FSS earth stations.

24. We believe that the usage scenario we propose will result in the most spectrally efficient use of the subject band by maximizing the available capacity, because it will support multiple “full capacity” systems in the same geographical area. It also focuses on a use for which there is a growing and compelling need.

25. This approach will complement and benefit other wireless network operations in other bands by providing a practical, affordable “backhaul” option to those other networks, as well as supporting the needs of businesses, schools, and other entities requiring reliable, economical point to point links that are able to bridge relatively large distances.

26. As stated above, IEEE 802.18 believes that the most efficient use of this band will be achieved through the specification of a minimum directional antenna gain (and/or 3dB beamwidth) and restricting the use of the band to fixed point to point links based on appropriate link engineering practices to assure that interference does not occur, either to licensed services or between unlicensed systems.

COMMENTS ON THE FSS PROTECTION ZONES

27. In response to the Commission's request for comments on FSS protection zones,¹³ we believe that, *with proper link engineering for the fixed point to point mode of operation that we propose*, the protection zones could likely be reduced considerably, if not eliminated, with proposed links located near FSS earth stations being engineered and coordinated on a case by case basis.

28. We would be willing to work cooperatively with technical representatives from the FSS industry to develop appropriate methods for facilitating the conduct of such link engineering and coordination. A web-based, database oriented mechanism seems to us to be a highly practical solution.

29. Preliminary discussions with engineering representatives from one of the major national television networks that operates a large number of C-band FSS stations indicates a willingness on their part to work cooperatively with IEEE 802 to develop a mutually acceptable solution. We would hope that technical representatives from the other television networks and other operators of C-band FSS systems would exhibit a similar willingness to work cooperatively for our mutual benefit.

¹³ See the NPRM at 46.

**COMMENTS ON THE COMMISSION'S PROPOSALS FOR NON-FIXED
UNLICENSED OPERATION**

30. As stated above, we believe that non-fixed unlicensed operation in the subject band as proposed in the NPRM presents a sufficient number of technical problems and economic/operational burdens as to be essentially impractical, considering cost factors and the need to reliably protect licensed services. For example:

- The inclusion of GPS capability in such low power, short range devices would impose additional costs that the market is unlikely to bear;
- Additionally, the ability to receive GPS reliably in indoor environments is questionable and will, at best be highly variable depending on the nature of the structure;
- Furthermore, the concept of requiring the inclusion of a separate receiver capable of tuning the FSS uplink bands to determine if an unlicensed device is near an FSS earth station appears impractical for two reasons:
 - First, not all FSS earth stations have uplink transmitters – many are “receive only,” which would not allow this approach to afford them protection.
 - Secondly the cost of including this receive capability would, like including a GPS capability, drive cost into such devices that the market for such devices would likely not bear.
 - Finally, due to the highly directional nature of FSS uplink stations, we are not convinced that this capability would be sufficiently reliable, even if it could be implemented in a cost-effective manner.

SUMMARY AND CONCLUSION

31. As stated and for the reasons elaborated above, IEEE 802 recommends that the Commission adopt rules that:

- Delete the existing unused FS and MS allocations.
- Limit unlicensed operations in the 3650-3700 MHz band to fixed point to point systems only.
- Disallow the use of this band by non-fixed systems.
- Specify the maximum allowable transmitter power and power spectral density and a minimum allowable directional antenna gain and/or 3 dB beamwidth.
- Consider a higher EIRP limit than the proposed 25W (14 dBW) to allow longer links, but require systems to use the minimum EIRP necessary to bridge the intended path with sufficient fade margin to the required C/N ratio to permit reliable operation.
- Encourage a cooperative effort between IEEE 802 and the incumbent licensees who must be protected to develop a mutually acceptable (preferably web-based, database driven) approach to facilitating the sound engineering and coordination of unlicensed links to assure that licensed stations are not interfered with.
- and, refrain from codifying fixed protection zones around such licensed stations, instead relying on the approach of engineering and coordination of unlicensed fixed links, in recognition of the wide variability of terrain and other factors that will cause the necessary separation/isolation between unlicensed link transmitters and licensed stations to vary from case to case.

32. We believe that these recommendations will result in the most efficient use of this relatively narrow band, while protecting licensed services, and will address the growing need for such links in support of a wide variety of users.

Respectfully submitted,

/s/

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